[0040] **FIG. 16***a* is a schematic illustration of a channeled microstructured surface of the present invention with a quantity of liquid thereon.

[0041] **FIG. 16***b* is a schematic sectional view as taken along line **16***b*-**16***b* in **FIG. 16***a*.

[0042] **FIG. 17***a* is a schematic illustration of a test assembly used in evaluating the heat and mass transfer attributes of the present invention.

[0043] **FIG. 17***b* is a schematic sectional view as taken along line **17***b*-**17***b* in **FIG. 17***a*.

[0044] **FIG. 18** is a cross-sectional cutaway view of the fluid control film of Example 15.

[0045] **FIG. 18***a* is a blow-up of a portion of the fluid control film of **FIG. 18**.

[0046] While several preferred embodiments are set forth in the above drawings, other embodiments are also contemplated, some of which are noted in the following discussion. In all cases, this disclosure presents the illustrated embodiments of the invention as representations, not limitations of the present invention. It is understood that one skilled in the art could devise numerous modifications to the present invention which would still fall within the scope and spirit of the invention.

Definitions

[0047] Unless otherwise specified, the following terms should be construed in accordance with the following definitions:

[0048] Fluid control film ("FCF") refers to a film or sheet or layer having at least one major surface comprising a microreplicated pattern capable of manipulating, guiding, containing, spontaneously wicking, transporting, or controlling, a fluid.

[0049] Fluid transport film ("FTF") refers to a film or sheet or layer having at least one major surface comprising a microreplicated pattern capable of spontaneously wicking or transporting a fluid.

[0050] Fluid transport tape refers to fluid control film with some means for adhering the film to a substrate on its other major surface.

[0051] Microreplication means the production of a microstructured surface through a process-where the structured surface features retain an individual feature fidelity during manufacture.

[0052] Liquid landing zone refers to any area or portion of a structured surface that is aligned for initially receiving liquid thereon.

[0053] Liquid removal zone refers to any area or portion of a structured surface that facilitates the transport of liquid over the structured surface and away from the liquid landing zone.

[0054] Aspect ratio is the ratio of a channel's length to its hydraulic radius.

[0055] Hydraulic radius is the wettable cross-sectional area of a channel divided by the length of its wettable perimeter.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0056] The present invention relates to articles that incorporate a fluid control film component. At the beginning of this section suitable fluid control films will be described generally. Descriptions of illustrative articles incorporating these films, and examples thereof, will follow.

[0057] Suitable fluid control films for use in the present invention are described in U.S. Ser. Nos. 08/905,481; 09/099,269; 09/106,506; 09/100,163; 09/099,632; 09/099,555; and 09/099,562; and U.S. Pat. Nos. 5,514,120; 5,728,446; and 6,080,243. Preferred fluid control films of the invention are in the form of sheets or films rather than a mass of fibers. The channels of fluid control films of the invention preferably provide more effective liquid flow than is achieved with webs, foam, or tows formed from fibers. The walls of channels formed in fibers will exhibit relatively random undulations and complex surfaces that interfere with flow of liquid through the channels. In contrast, the channels in the present invention are precisely replicated from a predetermined pattern and form a series of individual open capillary channels that extend along a major surface. These microreplicated channels formed in sheets or films are preferably uniform and regular along substantially each channel length and more preferably from channel to channel. Preferably, such a film or sheet is thin, flexible, cost effective to produce, can be formed to possess desired material properties for its intended application and can have, if desired, an attachment means (such as adhesive) on one side thereof to permit ready application to a variety of surfaces in use. In some embodiments, it is contemplated that the film may be inflexible.

[0058] Certain of the fluid control films of the present invention are capable of spontaneously and uniformly transporting liquids along the film channels. Two general factors that influence the ability of fluid control films to spontaneously transport liquids (e.g., water, beverages, condensate, cleaning solutions, etc.) are (i) the geometry or topography of the surface (capillarity, size and shape of the channels) and (ii) the nature of the film surface (e.g., surface energy). To achieve the desired amount of fluid transport capability the designer may adjust the structure or topography of the fluid control film and/or adjust the surface energy of the fluid control film surface. In order for a closed channel wick made from a fluid control film to function it preferably is sufficiently hydrophilic to allow the desired liquid to wet the surface. Generally, to facilitate spontaneous wicking in open channels, the liquid must wet the surface of the fluid control film, and the contact angle be equal or less than 90 degrees minus one-half the notch angle.

[0059] The channels of fluid control films of the present invention can be of any geometry that provides desired liquid transport, and preferably one that is readily replicated.

[0060] The inventive fluid control films can be formed from any polymeric materials suitable for casting or embossing including, for example, polyolefins, polyesters, polyamides, poly(vinyl chloride), polyether esters, polyimides, polyesteramide, polyacrylates, polyvinylacetate, hydrolyzed derivatives of polyvinylacetate, etc. Polyolefins are preferred, particularly polyethylene or polypropylene, blends and/or copolymers thereof, and copolymers of propylene and/or ethylene with minor proportions of other monomers,